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NONRUSTING TURBINE OIL

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This invention has to do with lubricants and is more particularly concerned with lubricants for ferrous metal surfaces in an environment where such surfaces are also subject to contact with water and in consequence are likely to rust.

As is well known to those familiar with the art, difficulties have been experienced during the initial operation of new steam turbines because of the rusting of ferrous metal parts. The combination of fresh (not previously used) oil; clean, new metal surfaces; and moist conditions of operation appears particularly conducive to resting difficulties. Particles of rust formed on or carried to the rubbing surfaces of small clearance, such as the governor, for example, tend to cause sticking, which renders them inoperative. In cases of severe rusting, bearings may be injured.

This rusting phenomenon under conditions of the type outlined above is evidently the result of improper or inadequate "wetting" of the metal surfaces with oil, thus permitting a preferential contact of the surfaces with the water which is present. One expedient used in the past to prevent rusting under these conditions has been to mix several per cent of an oil which has been previously used in turbine operation for a considerable period of time with the new oil. The oxidation products in the used oil cause the oil to "wet" more adequately and better adhere to the metal surfaces. Such an expedient, however, not only introduces those oxidation products which protect against rusting but introduces as well other oxidation products, which promote the formation of sludge and acidity and increase emulsifying tendencies. Other materials such as stearic acid have been proposed; but such additives, although they do prevent rusting, have the undesirable property of unduly raising the acidity (N. N.) of the oil and of accelerating the development of acidity in use.

The present invention is based upon the discovery that degreas (wool grease) may be admixed with a turbine oil in minor proportions to provide an oil composition which may be used during the break-in period of a new turbine without undue rusting of the parts, and upon the further discovery that the value of the degreas in the oil and the effective life of the oil composition may be materially increased by the presence in the oil-degreas mixture of a minor proportion of an oxidation-inhibitor such as aniline disulfide.

The oil used in the composition may be of the types normally used for the lubrication of steam turbines. In general, the oil may be defined as a

viscous mineral oil fraction having a Saybolt Universal viscosity of from 100 to 600 seconds at 100° F. Typical turbine oils with which degreas and a mixture of degreas and aniline disulfide have been admixed to provide improved turbine break-in oils have the following specifications:

Table I

	Oil A	Oil B
Gravity, °A. P. I. _____	28.4	24.8
Pour test, °F. _____	5	10
Flash, °F. _____	385	390
Color, A. S. T. M. _____	1	1.5
Viscosity, Saybolt @: _____		
100° F. _____	148/155	315/325
130° F. _____	84.5	145
210° F. _____	43	50

The quantity of degreas used should be an amount sufficient to cause a preferential wetting of the metal surfaces with oil, and it is very small compared with the amount of oil present. In general it appears that degreas in amounts of from about 0.05 per cent to about 0.2 per cent may be used.

The aniline disulfide should be present in an amount sufficient to inhibit the formation of acidic products of oxidation in the oil-degreas mixture, and in general it appears that from about 0.05 per cent to about 0.2 per cent of aniline disulfide will be adequate for this purpose.

Typical and highly satisfactory compositions have been prepared from the two oils above identified as "Oil A" and "Oil B" by admixing therewith 0.07 per cent by weight of degreas and 0.1 per cent by weight of aniline disulfide. With base stocks of the aforesaid type it was found that 0.07 per cent of degreas afforded adequate rust protection; and although such blends without any antioxidant developed a neutralization number of only from 0.08 to 0.1, it is considered desirable to employ a small quantity of an antioxidant in the blend for the most satisfactory product. A blend of the class described containing about 0.1 per cent by weight of aniline disulfide in addition to the degreas developed a neutralization number of only 0.02 in the Brown-Boveri oxidation test.

The test employed to demonstrate the effectiveness of the oil blends in preventing rusting involved the immersion of strips of cold rolled steel in a beaker of oil containing 1 per cent of water. The mixture of oil and water was vigorously stirred for 48 hours at a temperature of 140° F. After the test had been run, the strips were examined and rated on the amount of rusting visu-

ally observable. In rating the specimens the complete absence of rust is indicated by the numeral 0; mild rusting is indicated by 1; moderately severe rusting by 2; and very severe rusting by 3. The table below clearly shows the effect of degreas as a rust preventative in either a blank oil or an oil containing aniline disulfide.

Table II

Oil tested	Degrees of rusting
Oil A alone	3
Oil A+0.1% aniline disulfide	3
Oil A+0.07% degreas	0
Oil A+0.1% aniline disulfide and 0.07% degreas	0

From the foregoing it will be seen that a minor proportion of degreas in an oil or an oil blend containing an antioxidant, such as aniline disulfide, will provide a lubricant which may be effectively used in the presence of moisture to prevent rusting of ferrous metal parts by the moisture present. It is to be understood that although we have herein described and illustrated the invention with certain preferred mineral oil blends, the invention is not restricted to the specific examples given but includes within its scope whatever changes fairly come within the spirit of the appended claims.

We claim:

1. A lubricant comprising a viscous mineral oil and in admixture therewith a minor proportion, from about 0.05 per cent to about 0.2 per cent, of degreas and a minor proportion of aniline disulfide.

2. A lubricant comprising a viscous mineral oil

and in admixture therewith 0.07 per cent of degreas and 0.1 per cent of aniline disulfide.

3. An oil composition adapted for the lubrication of ferrous metal surfaces in an environment containing water, comprising a viscous mineral oil having in admixture therewith a minor proportion, from about 0.05 per cent to about 0.2 per cent, of degreas sufficient to cause preferential wetting of the metal surface with oil and a minor proportion of aniline disulfide sufficient to inhibit the formation of acidic products of oxidation in the oil.

4. An oil composition adapted for the lubrication of ferrous metal surfaces in an environment containing water, comprising a viscous mineral oil having in admixture therewith a minor proportion, from 0.05% to 0.2%, of degreas sufficient to cause preferential wetting of the metal surface with oil and a minor proportion of an antioxidant sufficient to retard the formation of acidic products in the oil.

5. An oil composition adapted for the lubrication of ferrous metal surfaces in an environment containing water, comprising a viscous mineral oil having in admixture therewith a minor proportion, from 0.05% to 0.2%, of degreas sufficient to cause preferential wetting of the metal surface with oil.

6. A lubricant composition comprising a mineral oil fraction having a Saybolt Universal viscosity of from 100 to 600 seconds at 100° F. and having in admixture therewith a minor proportion, from about 0.05 per cent to about 0.2 per cent, of degreas and a minor proportion of aniline disulfide.

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